ABSTRACT
This paper investigates the needs of a PFM (Personal Financial Management) tool in a projected banking app, where information is presented as statistics of the users’ personal economy. By studying how youths would like to monitor their finances in a banking app the paper aims to investigate what a PFM tool could include to attract consumers to use it in order to get a better control of their finances. The question of the paper is therefore: How can a banking app containing a PFM contribute to greater awareness of the users’ finances and savings, and how should such an app be designed?

User tests were made to investigate what kind of statistics the users want in a PFM tool in a mobile app. The Delphi method was used to get a ranked list of ten suggestions, and a focus group interview was conducted to analyze the results further and to contribute to a qualitative view of the paper.

The test results together with previous research show that a PFM tool included in a banking app could attract the target group to monitor their money, and also encourage them to save more. The respondents would like to have general statistics over their economy in a PFM tool, but also the possibility to monthly set personal budgets and monitor how well they are respected.

Author Keywords
App, Mobile banking, PFM, Usability.

INTRODUCTION
The digitalization of mobile technology has rapidly become intertwined to our daily lives and is today well known and applied of most companies and institutions [3,6]. The mobile devices can be with us everywhere and are a useful tool in our daily experiences [6]. Many banks have joined the trend and have gone from traditional bank offices and Internet solutions toward mobile banking [2]. Mobile banking includes bill-payments, transactions between accounts and show current account information.

As a customer there are several advantages using mobile banking, and Gustke [7] gives examples including both good safety and great accessibility. The services are protected by passwords and other ID checks, which make it hard for unauthorized persons to reach it. Mobile banking is still a new area, which also enables great opportunities for it to grow and become even better. Still, mobile banking has far fewer options and functions than Internet services, and are focusing on tasks that the users want to handle every day.

A PFM tool gives an opportunity for customers to have further access to their banking accounts and to look at balances and transaction summaries, often in statistics and diagrams. It is possible to see where the money is going through different categories and compare that information to a pre-planned budget. It is also possible to monitor cash flows and to set goals. Bill-payments and transactions are often integrated which make it possible for the user to compare that to other information [11].

Today there are various third-party providers at the market, which are not banks but give the user access to connect their banking accounts and get an online PFM. Mint.com is an example, which today has over 9 million registered users. However, a recent study by Forrester research [11] shows that 75 percent of the consumers would still like to use their primary financial institution integrated with a PFM tool, much because of higher safety.

Previous research show that youths are the target group that saves the least, but also the user group who thinks it is most important to save [10]. The working hypothesis of this paper is that a PFM tool in combination with a mobile phone can encourage the target group to save more and help to get a better view of their economy. Much due to a mobile phone has the ability to be a consistent present in a customer’s life [8]. This is an area that is not fully explored yet, and the explained combination will be tested in this paper by user tests, and supported by previous research.

RELATED WORK
The related work in this area addresses the field of user behavior during use of a mobile app. In what way is it possible to affect a behavior?

Stewart [11] introduces what a PFM tool is and explains that a tool including spending, budgets and cash flows can help users to raise their financial IQ. It can also solve the
problem that 14 percent of the customers neither monitor nor manage their finances. A PFM in combination with a mobile platform could be a useful way to meet the consumers where they want to be according to Stewart, and the next step is to make them even more available to the users. Reaching a PFM’s full potential can be done through great user experience, interaction design and to entice the user to frequent use. A PFM tool could be relevant to most people, especially since Mas & Mayer [8] declare that there are three things every household need to handle: payments, budgets and savings. For many people, saving money entails making daily sacrifices, and often cutting into basic needs. Therefore people are looking for techniques to save regularly, in an amount that they can afford, and a meaningful and usable financial service has to be designed to help them with that.

A mobile phone is a given solution to integrate savings, budgets and payments into the customers’ life, in a seamless way. Mas & Mayer [8] also state that a mobile phone has the possibility to be a consistent present in a person’s life with the ability to help them “budget for today and save for tomorrow”. According to them, the interface of the application will be the key determinant of how successful it will be in facilitation of the financial situation. Fogg & Eckles [6] further discuss that a mobile phone can be a tool that provides us with insights into understanding habits that are harmful to our health and wellbeing. The mobile phones do not only have the capability to change behaviors and decisions, but also promoting a dialog about issues at different levels. Fogg & Eckles [6] state that there are two design strategies needed to motivate initial use of a mobile application and to encourage continued use over time: to give the user immediate personal benefits, and to give key information to improve awareness so that the user will realize the positive impact of the change in the daily life.

Fogg [5] agrees with Mas & Mayer [8] that people want to save regularly, and states that an app should be designed to start a routine, for repeatedly use. He also presents a model (called A behavior model) where a behavior is a product of three factors: motivation, ability and triggers. This model could be a factor to change peoples’ behaviors about payments, budgets and savings, which Mas & Mayor state. According to Fogg all those three factors must be involved at the same time if a behavior change should happen. If a behavior is still not changing, tests can be done to see if one of these three factors is missing, and how they can be improved. As described above Mas & Mayer declare that all people needs to handle their economy, and a study from SBAB [10] shows that 94 percent of the Swedish population thinks that it is very or quite important to save. This shows that the factor of motivation already is high, and that the prospects of people wanting to use a mobile PFM tool are good. Especially youths in the age between 15-25 think it is very important to save (66 percent), and two thirds state that they are not saving enough. In the same age range 56 percent of the youths have bad conscience because they are not saving more money, but still they like to look at themselves as a “saver” instead of a ”spender”.

The presented articles above describe what a PFM tool is and how it can be used. They investigate how a behavior can be influenced and what factors that affect a person’s behavior. It is also shown that todays’ mobile phones are a strong and effective way to maintain a constant presence in a consumer’s life. The use of mobile banking will expand and is therefore an area worth further exploring.

An area that is not shown yet, and that this paper aims to investigate, is if there is possible to integrate a PFM tool in a mobile app in order to affect behaviors of the users. By user tests and prior research, it will investigate if it is possible for a PFM tool to contribute the user with a greater awareness of their personal economy and how to help them to save more money. Mobile banking is an upcoming area and more and more functions are moving from Internet solutions toward mobile platforms. Since many people do not know how to manage their financials [11], the combination of mobile phones and PFM tool could be a path to a solution.

The question that this paper aims to answer is therefore: How can a banking app containing a PFM contribute to greater awareness of the users’ finances and savings, and how should such an app be designed? The aim was go get an overview in the state of mobile banking in Sweden today and how it can be improved.

METHOD
A user test has been conducted with a group of potential users in order to find out what kind of statistics that could be useful in a bank app’s PFM tool. The test is an adapted version of the Delphi method, which is a proven tool in the area of information systems [9]. It is explained as an experimental study of a group opinion, and the aim of the method is to obtain the most reliable consensus of a group of people who are familiar with the matter. The method is normally rewarding when a solution is desirable where there is no given answers. The performance of the method is to use the group of people as experts in a certain question. The chosen participants are recommended to be between 10 and 18 people, and they all get the same form of questions that often are of high uncertainty and speculation. In this case the questions was formulated as follows:

1. What kind of statistics and diagrams would you like to see in a banking app with a PFM tool? Give two suggestions and motivate why those are interesting for you.
2. How do you think a PFM tool can help you to save more money?
3. Do you use any kind of mobile banking applications today? If so, which?
The test included 10 persons that answered the three questions individually, without knowing the other participants. The participants in the test were between 20–30 years old (average 25.2 years), consisting of six females and four males. The participants were chosen from the Stockholm area with the criterion that they should all have experience in mobile banking. The respondents were all acquainted with the author in order to get a high response rate, which although can give some biased answers. The effort was to explore what kind of statistics the target group wished to use in a banking app, and how they would like to use it. Finding people in the right target group and a convenience sample made the selection of participants and they all have some experience of mobile banking. The first question in the test was gathered and compiled into a list where exact duplicates were removed and the terminology where unified. It later resulted in ten suggestions of what the testers wanted to use in a PFM tool in a banking app. The new and organized list was sent back to the same participants for a second round, and the task was to rank the list in a priority order.

Finally, ten prioritized lists with suggestions were collected, with statistics that could be included in a PFM tool. By giving each of the prioritized suggestions a “point” according to its ranking order, it was possible to determine the average order of the ten collected tests.

E-mails was used as a way to share information which, according to the Delphi method, is a useful tools to collect data since the testers are anonymous to each other and do not need to meet live [9]. Because the Delphi method advocates that the participants are experts in the area, this test is an adapted version to better fit the purpose of the paper. Instead of being experts in the mobile banking area, the testers are in the target group for the app. They all handle their own economy and are users of a smartphone. That makes the results of the method relevant to answer the question of the paper, and there is possible to see what kind of statistics the users would be interested in to use.

**Focus group interview**

In order to get a more qualitative view of the area a focus group was formed and interviewed. The group consisted in three participants from the previous test. There were two males and one female, aged 21, 23 and 25 years. The interview started with a phase where the participants got an explanation of the user test so far, and each of them got a printed copy of the compilation of the ranked lists. A few questions were asked, which they were reflecting on all together. The questions concerned the results from the previous test in order to dig deeper into what kind of statistics they would like in a PFM tool, but also what they think about the fact that a PFM tool could help them to change a behavior and save more money.

**Design solutions**

In order to ensure how a PFM tool should be designed into a mobile banking app, suggestions of the interface was proposed and presented. Ensor et al. [4] presents a list over the functions that are used most often in a banking app:

1. Look at current account balances
2. Look at previous transactions
3. Transfer money between own accounts
4. Pay bills
5. Transfer money to other accounts

The design suggestions of the mobile PFM tool are connected to the second item in the list: “look at previous transactions”. This PFM tool is therefore an extended version of looking at transactions, where users can see their information in different forms of visual graphics instead of in a classic list form.

The suggestions show an interface of a prospected banking app where the user’s purchases automatically is categorized into different categories, and sorted by colors (see Figure 1). The categorization is changeable by taping a colored spot, and it is also possible to choose sub categories. By tilting the phone sideways statistics over the users’ finances shows (See Figure 2). In the view with the statistics a clarification of the colors is displayed as well as arrows in
the sides that indicate that it is possible to swipe between different kinds of diagrams. The suggestions are prepared as wireframes both by hand (paper prototyping) but also digitally in a software program.

A user test with prototypes was conducted in order to test the suggestions on proposed users. They were performed as recommended [1], where a user is looking at a paper version of the application and are “clicking” around to test the interaction design in it. In this way it is possible to detect flaws in the interface, in an early stage that was not usable enough to understand. The wireframes that was tested by the user was based on an existing banking app, where the expected functions were added and the interaction was adjusted. After the tests they was updated according to the results and notes from the user testers. Finally a definitive version was produced as a compilation of what could be used in a mobile PFM tool.

RESULT

The conducted Delphi method gave concrete information of what kind of statistics and diagrams the target group would like to have and use in a PFM tool. It also gave relevant thoughts about using a PFM tool in an app, and how the target group thinks about their personal savings.

The feedback with the ranking order of the suggestions was compiled in order to find a result on the average ranking.

Top five of the most required suggestions are:

1. General diagram of all your incomes and spendings
2. Pie chart showing how much money that has been spent in each category
3. Possibility to monthly set up a budget for your purchases in each category. Statistics will be presented over how well you follow the budget and what more you can effort to spend.
4. Diagrams where your fixed outgoings already are set for each month. In this way you can make a plan for the rest of your money.
5. Possibility to be alerted when you are close to a pre-set limit in a certain category.

The top-5 list shows that the users mainly want to see general statistics over their economy, since they on the first place ranked a "general diagram over incomes and outgoings" and on the second place ranked "pie chart over their spendings". Several of the testers mentioned at least one of these two suggestions in the test, and they also ranked them high on the ranking list.

The third and the fourth suggestions are about the possibility to set up a personal budget ("set a budget for purchases" and "set a budget for fixed outgoings and the remaining money"). There were different kind of suggestions in the Delphi method about the possibility to set up a personal budget, both including outgoings and savings.
The fifth suggestion was about getting an alert when a preset budget is close to a certain limit. This can include both when the user should not spend more money in a certain category (e.g., clothes), but also when an income budget is reached so that the user can save more. An alert like this could also be connected concretely to advices of how you could keep your budget or from what category you can put money to your saving account. This gives a clear advantage of using a PFM tool in a mobile phone since triggers assume to be used direct to the user, which a computer cannot fulfill.

Suggestions that were ranked at place 6-10 included other diagrams that could be integrated in the PFM. They were about savings, prioritized purchases, making better plans and possibilities to sort out “unnecessary” spendings.

Since the Delphi method gave two suggestions from each participant, 20 suggestions were collected. 10 of them were removed because of duplicates, which mostly included the top two suggestions in the ranking list. One of the two suggestions from each tester usually included one more general suggestion, the other a more innovative, like setting own budgets and getting advices of how to keep them. Generally people did not rank their own suggestions at the first place, but still high on the list (average at place 3.4 of 10). This shows that the participants took advantage of getting new advices from other test persons.

The other two questions in the test, that was not included in the second round of the Delphi method, still gave information of the users’ thoughts of a PFM tool.

Generally the testers are positive about starting to use a PFM tool and they believe that it could improve their economy in a good way. The users in the target group think that a PFM can help them to save more money if it is possible to get a good overview of their whole economy, preferably separated into different categories. This overview would also help them to see costs which by the user themselves are classified as unnecessary, so that these can be reduced. Five participants independently mentioned that it would be interesting to set up private goals in each category so there will be possible to know when a budget is reached. Three of those five people also said that they would like to have alerts or reminders to get informed when a goal or a pre-set budget is reached.

The results from the user tests with the prototypes of the interface shows that a categorization system using colors is a useful tool, since the users often are used to that kind of groupings. Clicking at the colored spots is also a clear indicator that the existing category can be changed. The tilting function generated positive feedback and shown to be a clear view of displaying the information in combination with the related functions. One subject that was discussed on the user tests was how to indicate that it was possible to tilt the phone to get the view with the statistics. An icon was tested, of a small tilting phone, which the user could tap and get a hint of the possible action. To get this to work properly the icon must be designed in a very obvious way. Another version was later tested where the user got a quick pop-up information box, with simple information over the hidden function (See Figure 3). It appeared just before the user entered the transaction view, which gave a very clear signal to the user. This last attempt also turned out to be the most successful and stated that a simple and short formal text can be better than a slightly diffuse icon.

All of the participants in the Delphi test have more or less been using a banking app before the test; seven of them are using it regularly. The reason why three of the testers are not using a banking app regularly differs, but depends on lacking availability of a working smartphone or that they prefer to use the Internet solution. Only one of the testers is using a PFM tool today, but still the majority thinks that it would be good to use one.

Results from the focus group interview

In the focus group interview the target group was asked further about the ranked list and the collected suggestions, but also about the fact that a PFM should be able to raise the users awareness about their finances.

When the testers had read the ranked and compiled list they quite much agreed with the order, even though they realized that it was not exactly the same as they had ordered it. They got the information about the different groups in the list; that the top results were about general statistics, the third and fourth were about the possibility to manage their own budget planner, and the fifth about getting alerts and reminders. All of the testers were satisfied with the general suggestions being placed at the top of the list, with a motivation that those often are needed as a basis before other diagrams can be properly used. They also like to have the possibility to handle their budget planner considering their own economy, and guesses that this is why these suggestions (at place three and four) have been placed high on the list.

When talking about the suggestions at the bottom of the list, a general thought was that they might have been too advanced, and in that way too complicated to use. All the testers agreed that the PFM must be a tool that is easy to use, and with the possibility to adapt it, there will be possible for users that are more interested to use more functions. They also emphasized that it will be useful if it is really easy to use and if most of the information will be sorted automatically. One of the testers points out that he is interested in getting a better view of his financials, but if there are too many functions that must be filled in manually he will probably stop using the tool. They therefore like the function where all the purchases are categorized automatically; “Even if there will be mistakes sometimes it is better to correct them manually instead of being compelled to categorize them all manually every time”. The
How important do you think it is to save?

![Figure 4. Diagram of how important different target groups think it is to save money. Adapted from SBAB [10].](image)

The group concludes that the less time they have to put on managing the PFM tool, the better. Instead they want to spend the time on analyzing the budget results and on getting the results even better next time.

Having a nicely designed and inviting user interface will probably encourage the usage, according to the testers. As they explain it, they are already “looking at numbers in their existing apps”, so the interest in using a PFM tool is that it should give visualized and aesthetically pleasing information that ordinary banking apps do not.

Finally, the persons in the focus group interview think that a PFM tool can make people to care more about their economy, and by caring more and getting an overview of it, it makes it possible for them to save more. It is noted that the PFM itself does not make more money on the users’ saving accounts, but by having these tools the users are more able to realize what actions needs to be done in order to save more money.

**DISCUSSION**

The result of this paper shows that people in the target group are positive about using a PFM tool in a banking app (See Figure 4). The majority of the target group thinks that it would be both interesting and necessary to use a PFM tool in order to get a better view of their economy, but still two thirds think that they are not saving enough [10]. This is why a behavior change is needed in order to get youths to save more. Fogg’s behavior model can be used [5] to promote a behavior change, which claims that three factors needs to be considered in the process of changing a behavior. The person must be motivated, must have the ability to change a behavior and must get necessary triggers to accomplish the behavior change.

A motivator is the first factor in the model that Fogg [5] presents. It should encourage the use of a PFM tool; give the user a good view of the economy and be a safety knowing that there are money saved for emergencies. With a better view of the economy and simplicity to save, unexpected occurrences will be reduced, which increases the safety. In that way a motivation factor will be pursued and contribute to a behavior change. This is in unity with what Stewart [11] call “the raise of a humans financial IQ”. By getting motivated to handle spendings, budgets and cash flows people will also be in a better position to handle their economy. User tests conducted for this paper showed that the target group is positive toward using a PFM tool and thinks that it could help them to save more money. Still only one in ten is using such tools today, according to the user tests, and 56 percent have bad conscience because they are not saving enough [10]. If the PFM tool could motivate them with a informative and nicely designed tool there is possible that a larger number of persons will change a behavior and increase their savings.

The second behavioral factor according to Fogg [5] is ability. The user must have the ability to use a banking app, which can depend on factors like time and costs. If the app takes a lot of time, or costs, some users will reject it. Since some people think that an app that costs money is not simple, or that an app that takes a lot of time is not simple, it must be adjusted to the target group and be designed so it will fit for that specific purpose. Also Mas & Mayer [8] agrees and state that the app should be designed to start a routine, so that the customers will repeatedly use it. The mobile phone has the possibility to be a consistent presence in a user’s life [8,6]. By combining the PFM tool with a phone it meets the customers where they want to be, and the possibility to save time is greater. An app that does not cost is therefore available to a larger group of people. People from the user test and from the focus group interview state that the tool will be more easy to use if it has an enjoyable user interface that is aesthetically pleasing and easy to use. This supports that the ability also depends on the accessibility of the interface.

A trigger is the third factor and needed in a persuasive product according to Fogg [5], especially when people have sufficient motivation or ability to perform a task. In a mobile PFM tool a well-designed trigger could be an alert that reminds the users of something. It can alert when a
specific budget is reached or when it is time to put more money on the saving account. An alert does also comprise with [6] recommendation that the user needs key information to encourage continued use over time. Together with the statistics in the PFM tool an alert will make the user realize the positive impact of the changed behavior. The statistics gives the user positive feedback of the actions, which therefore encourage frequent use.

**Required statistics**

As described above, previous research [10] shows that the target group is positive to save more, and think that saving is important, but still do not save enough. The conducted user tests supports that the target group is willing to use a PFM tool if it could help them to save more, and to get a better view of their economy. Several of the testers mention that it would be possible for them to save more money if they had the possibility to plan a budget ahead and to set private goals. In the focus group interview it clarifies that the PFM tool can help people to care more about their economy, and in that way also help them to save more. The target group will probably use a well adapted tool that does not take much time, or do not need to be maintained often. A useful overview of the economy makes it, according to the user testers, easier to prioritize and to keep the budget. There is also a wish from the testers to sort the purchases into different categories, and in that way make a more precise plan for their spendings.

Previous research obviously shows that youths would like to monitor their finances in a better way and that they think it is an important subject. Still, only one in ten of the user testers are using a PFM currently. As described earlier 75 percent of the customers would like to use their primary financial institution integrated with a PFM tool, instead of using a third party provider. This gives good prospects for the target group to use a PFM tool in combination with mobile banking.

The design of the tool has shown to be an important aspect, both according to graphic design and interaction design. The user testers wish to see a graphic design that pleases them, and encourage them to use it more. Mas & Mayer [8] argues that the interface of the application is an important determinant of how successful it will be, and several user testers agree that there will be more fun to use a system with a pretty interface. With an interface that is interesting to look at and interact with, the chances of more frequent use will probably increase. The Delphi method and the focus group interview showed that the interaction design have to be both clear and simple so that more users will be pleased to use it. In this specific example of the PFM tool, the category system was working well with colored spots since the users are used to categorizations by colors. Clicking on a spot to change category was also a well-known behavior. Tilting the phone and getting more information has shown to be a function that must have a clear explanation to the user. An information box that was tested gave clearer signals to the users, more than the first tested icons.

The results from the Delphi method test showed that the target group wants to consume general statistics of their budgets, but also have the possibility to plan a private budget and to set goals. Several of the participants claim that a PFM tool in a banking app could help them to save more, if there was possible to set a plan for the economy. Some of them also wish to have the possibility to make budgets over different categories. The motivation of the testers is that it is more realistic to stick to a plan that fits to the user's specific budget, as the user has made with the previous economy in mind. They also have a positive attitude toward getting alerts when a budget is reached or a pre-set limit is passed.

According to Mas & Mayer and Fogg [8,5] people are looking for techniques to save regularly, in an amount that they can afford. Payments, budgets and savings are activities that most people need to handle, and by finding a solution that fit them the chances that they will save more will increase. The focus interview agrees that a PFM tool that has the possibility to adapt after the user is the best one, since all users probably would like to use it with different frequencies and in different situations. The majority of the user testers are positive to use a smartphone to handle their economy, and they would like to adjust their PFM tool to fit their specific needs. If a PFM tool can satisfy those needs there could be possible to change the users behaviors toward save more money by using a banking app.

**CONCLUSION**

This paper investigates if it is possible for youths to change a behavior toward getting a better overview of their finances using a PFM tool. Suggestions were collected of what kind of statistics users wants in a banking app. The top required suggestions included general statistics of the users private economy, but also possibilities to set personal budgets and ability to control them.

Youths are the user group who think it is most important to save money for the future, but they are also the group that today saves the least. Many of the users in this user group have bad conscious because they are not saving enough, and according to the test results, the majority thinks that they could save more and get a better view of their economy if they had a PFM in their banking app. *Motivation, availability and triggers* are factors that could help the users to save more money with a banking app. There is also possible that alerts can help them to save more money by giving important information about their economy and advices on how they can act to achieve that result.

In future work there would be interesting to test the top suggestions in a PFM tool on the users. In that way there is possible to get one more round with inputs of what actually works in an app, and what does not.
REFERENCES


